Blissful Blueberries

PEGGY GREB (K9050-1)

Good things come in small, blue packages, and blueberries are a superior example. During the Civil War, weary soldiers drank beverages containing blueberries to invigorate themselves after a hard day's work. Native Americans once used the fruit to make pemmican, a type of meat jerky. Today, blueberries are a popular ingredient in muffins, pies, and even jelly.

Scientists at the ARS Small Fruits Research Station in Poplarville, Mississippi, have been researching blueberries since the 1970s, planting their first plants in 1971. It is because of research accomplishments at the ARS station that Mississippi started growing blueberries commercially. Since 1984, Poplarville residents have held an annual Blueberry Jubilee in honor of the berry and its contribution to small farm success.

"We have released six blueberry cultivars to date," says horticulturist James M. Spiers, who heads the Mississippi unit. "Cultivar development takes a long time, usually more than 10 years. Before we release a new blueberry plant, we want to know when the fruit ripens, that the plants grow vigorously, and that they produce high-quality fruit. Potential cultivars are tested in a few locations to determine climatic adaptability."

Biloxi, the newest blueberry, was recently released in honor of Biloxi, Mississippi's 300th birthday. It is an early-ripening southern highbush cultivar. Other ARS releases include Jubilee, Magnolia, Pearl River, Cooper, and Gulfcoast.

Southeastern growers produce two types of blueberries: rabbiteye and southern highbush. The rabbiteye type is more vigorous. Native to the South, rabbiteye is more adaptable to various soil types and more drought tolerant, and the fruit has a long shelf life. Southern highbush cultivars ripen earlier than rabbiteye cultivars and better fit the market window for growers in the southeastern United States. Most of the acreage in the Southeast is planted in rabbiteye cultivars, but more growers are planting southern highbush cultivars because of more favorable prices, Spiers says.

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A newly released southern highbush cultivar called Biloxi ripens earlier than most other blueberries and is adapted to the Gulf Coast. Above, technician Cynthia De Fouquette and horticulturist James Spiers examine fruit from the new plant.

"Many southern blueberry growers are small farmers who average about $2,000 an acre," notes Spiers. "The total acreage in Mississippi is about 1,800 acres. Many of these enterprises are small pick-your-own, roadside, or marketing cooperative-type farms. These farmers simply can't afford to lose their crops or even part of their crops to early freezes, insects, or poor management. We've been focusing on cultivar development and improving cultural practices, pest control, and postharvest handling," he says.

The Latest Buzz

Blueberries are a seasonal fruit in the Southeast, available from about the last week of May through July. But there's a lot of hard work that goes on long before the berries become available. Blueberries need bee pollination, and unfortunately, native bee pollinators are lacking in many areas of the southern United States.

"The most important pollinator in this area is the southeastern blueberry bee," says Blair J. Sampson, an entomologist with the Poplarville station. "These native bees are excellent pollinators but very difficult to manage commercially. They are ground nesters, so it's difficult to control them and bolster their population. Also, fire ants can be a problem because they will attack the bee larvae. I'm looking at the *Osmia ribifloris* bee, which is easy to manage, as a possible solution to the southeastern pollination problem."

Native to the western United States, the psychedelic bee looks like a throwback to the 1970s. It's a small desert mountain bee with bluish-green iridescent features. Sampson acquired the bee from fellow ARS entomologist James H. Cane with the Bee Biology and Systematics Laboratory in Logan, Utah. (For

PEGGY GREB (K9048-1)

The *Osmia ribifloris* bee is being developed for commercial pollination of blueberry crops. Here, entomologist Blair Sampson inspects a nesting straw of the bee.

more information on bee pollinators, see "New Pollinators Buzzing With Potential," *Agricultural Research,* May 2000, pp. 4-6.) In its native range, the bee gathers pollen from manzanita, a shrublike tree with thin, reddish-brown bark and flowers that closely resemble those of the blueberry.

Sampson has had the solitary bee in quarantine for a year. It takes about 300 bees, mostly female, to pollinate an acre of blueberries. He's developing strategies for growers to release and manage these bees. He says they should be available in 2 years. "These bees have excellent potential in this area because they have no major natural enemies here," he says.

Sampson is also looking at ways to control the blueberry gall midge, a fly that attacks the flower and leaf buds of blueberry plants. This pest is particularly bothersome and hard to control. It's not visible on the plants, and damage is often mistaken for frost damage, so the plants are not treated for the pest. It is a major blueberry pest, causing crop losses of up to 30 percent in Mississippi alone.

Sampson is turning to the midge's own natural enemies for ecologically safe pest control. "I've discovered possible new species of parasitoid wasps that attack midge larvae," Sampson says optimistically. He is working with ARS entomologist Michael E. Shauff, who is with the Systematic Entomology Laboratory in Beltsville, Maryland, to correctly identify the wasps.

"Once we get them identified, we hope to use them as biological controls for the midge," says Sampson. "They develop inside the bodies of the gall midge larvae, eventually killing them."

Nutritious, Safe Berries

Blueberries have been noted as a good source of dietary fiber and antioxidants, such as anthocyanins—the source of their pretty blue color, and vitamin C. These antioxidants fight cell-damaging free radicals. Blueberries also contain folic acid, ellagic acid, and bacterial inhibitors. One cup of the berries contains just 80 calories and 1 gram of fat—making it a healthy dessert or snack.

As if that weren't enough nutrition packed in one fruit, horticulturist James B. Magee, also with the Poplarville station, is screening southern cultivated and wild berries, including blueberries, for their potential to produce resveratrol. Resveratrol has been touted for its anticancer properties and cardiovascular benefits. He's collaborating with chemist Agnes Rimando, who is in the ARS Natural Products Utilization Research Unit, in Oxford, Mississippi.

"So far, searching for berries with high resveratrol content has been like an expedition," says Magee. "But once we find some, we hope to use them in our breeding programs to develop cultivars that will produce resveratrol in their fruit."

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Technician Donna Marshall and horticulturist James Magee measure resveratrol content in blueberries.

Magee is also conducting studies to examine microbial populations in fresh and frozen southern highbush and rabbiteye blueberries. This information about microbes can help processors develop a Hazard Analysis Critical Control Points (HACCP) plan for their processing plants.

"Microbial populations on the fruit vary in numbers and types of organisms. We want to know how these populations are affected by processing and how they may affect the end use of the berries from quality and safety perspectives," says Magee.

Total U.S. production for fresh and processed blueberries was 180.2 million pounds, valued at $156 million in 1999. "Our goal is ensuring that a good, wholesome market is available," says Magee.—By **Tara Weaver-Missick,** ARS.

This research is part of Crop Production, an ARS National Program (#305) described on the World Wide Web at http://www.nps.ars.usda.gov/programs/cppvs.htm.

James M. Spiers, James B. Magee, and Blair J. Sampson are in the USDA-ARS Small Fruits Research Unit, P.O. Box 287, Poplarville, MS 39470-0287; phone (601) 795-8751, fax (601) 795-4965, e-mail jspiers@ars.usda.gov jmagee@ag.gov